

THE BEST METHOD FOR KILLING AND PRESERVING BEETLES

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The importance of genital characters, especially of the male, in the taxonomy of Coleoptera is admitted by a steadily increasing number of specialists. After some training, the dissection, mounting and investigation of the genitalia as a rule involves no difficulty. However, the comparison of a series of genital slides may sometimes fail to provide a final decision as to the specific identity of the specimens, even in species possessing "good" genital characters. According to my experience of Carabid beetles this above all happens when these distinguishing features belong to the weakly sclerotized or otherwise mobile parts of the internal sac of penis. The final position of soft, membranous organ structures in the dried insect is apparently highly dependent upon the methods of killing and preserving used before mounting the specimen.

The procedure generally followed among North American coleopterists seems to be killing in cyanide and preserving in strong alcohol (about 70 percent). The cyanide causes violent contraction of the muscles, the alcohol hardening of all soft tissues. By this the beetle is made highly unsuitable for dissection of the genitalia. It is most difficult to handle under a microscope, a certain amount of brute force, with the risk of breaking, being necessary to conquer the stiffness of legs and elytra. And what is worse, the extracted penis often shows changes which must be ascribed to the influence of the cyanid or the alcohol, such as shrinking, deformation or even total eversion of the internal sac.

Dr. J. Manson Valentine (Smiths. Misc. Coll. 103, nr. 6, 1942, pp. 1-16) has recommended *ethyl acetate* (acetic ether) as the ideal killing agent for beetles. This method is now generally accepted in Europe, though in a somewhat simpler way than described by Mr. Valentine. We use glass tubes with cork stoppers, charged to about one third with dry, clean, coarse sawdust of hardwood, preferably poplar. The sawdust should be sifted to rid it from the smallest, dusty particles. Immediately before use about ten drops of ethyl acetate is poured into the tube and further liquid may be added during the course of the day if rich collecting causes risk of evaporation; the sawdust, however, should be kept just moist, not wet. When collecting on a locality or in a certain habitat is finished, the tube is labeled and, after the moisture of the sawdust has been checked, *the sample is stored as it is*. Provided the stopper shuts tightly, the beetles remain fresh and soft for a year or more. Thus on a collecting trip no time needs to be wasted on technical work which can be entirely postponed to the following winter.

Genital slides made from specimens killed by ethyl acetate, which causes relaxation instead of contraction of all soft tissues, show perfect uniformity in the position of the internal sac of penis and are therefore ideal objects for comparative taxonomic analysis. Concerning other advantages emanating from this liquid as a killing (and storing) agent, the reader is referred to the exhaustive article by Mr. Valentine. By these lines, in the hope of making converts, I have only tried to advertise the method from a different point of view.

It may be relevant to give a supplementary note on the best method for studying the inverted internal sac of penis. Its structures are often concealed by connective and muscular tissues or by pigmentation of the penis wall. In that case the whole

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organ should be boiled for a minute or two in a 15 percent solution of potassium (KOH) and then carefully washed in water. Through absolute alcohol it is then removed into a drop of clove oil, which in one or two days makes the organ completely transparent and allows a detailed study even at high microscopical magnification. A direct removal from the clove oil into canada balsam provides a permanent slide suitable for immediate investigation at any time. Personally I prefer to wash out the clove oil in absolute alcohol after studying the object and then to glue it to a corner of the piece of cardboard on which the insect is mounted.

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EDITOR